

CASIO®

Service Manual

(with price)

CTK-450



CTK-450

INDEX

ELECTRONIC KEYBOARD

MC-Service

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SPECIFICATIONS

General

Number of Keys:	61
Polyphonic:	16-note
Preset Tones:	64
Auto-Rhythms:	64
Auto-Accompaniment:	CASIO Chord/Fingered
Auto-Play Tunes:	Songs: 32 (Melody ON/OFF) Free Sessions: 32
Terminals:	PHONE/OUTPUT Jack [Output Impedance: 40 Ω , Output Voltage: 3.5V(rms)MAX], AC Adaptor Jack (DC9V)
Built-In Speakers:	10 cm dia. 1.5W Input Rating: 1 pec.
Power Source:	3-way AC or DC source AC: AC adaptor AD-5 DC: 6 D size dry batteries Battery life: Approx. 2 hours (SUM-3/R6P) Approx. 4 hours (AM-3/LR6) Car battery: Required optional car adaptor CA-5
Auto Power Off:	Approx. 6 minutes after the last operation
Power Consumption:	7.0 W
Dimensions:	86 x 920 x 291 mm (HWD) (3-3/8 x 36-1/4 x 11-7/16 inches) (HWD)
Weight:	3.5 kg (7.7 lbs) excluding batteries
Standard Accessory:	Music stand, Song book

Electrical

Current Drain with 9V DC:	
No Sound Output	130 mA $\pm$ 20%
Maximum Volume	400 mA $\pm$ 20%
with keys C3 to C4 pressed in Clarinet tone, Volume; Maximum	
Line Output Level (Vrms with 47 K Ω load each channel):	650 mV $\pm$ 20%
with key C6 pressed in Clarinet tone	
Phone Output Level (Vrms with 8 Ω load each channel):	120 mV $\pm$ 20%
with key C6 pressed in Clarinet tone	
Speaker Input Level:	1400 mV $\pm$ 20%
with key C6 pressed in Clarinet tone	
Minimum Operating Voltage:	5.7 V

MC-Service

DISASSEMBLE INSTRUCTIONS

Note: The keyboard PCBs are fixed to the case by springy clicks instead of by screws.

To disassemble keyboard PCBs

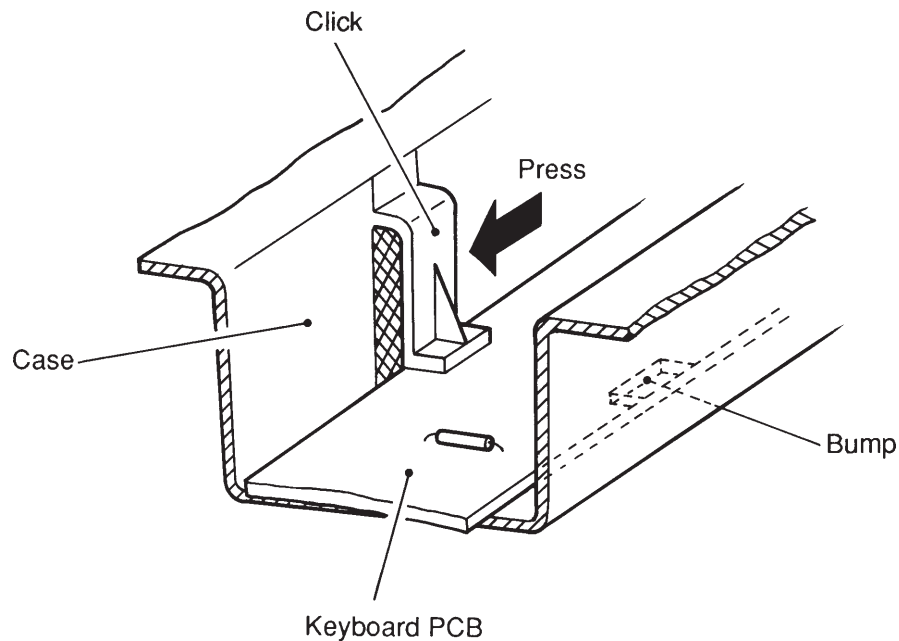
1. Using gentle force, press a click to release the PCB from the click.
A click can be caught in the slit behind of it, or can be deformed if too much force is used.
When a click is caught in the slit, return it to original position with a tweezers.
2. Release the clicks one by one from an end to another along the PCBs.
3. Take off the PCBs.

To reassemble the keyboard PCBs

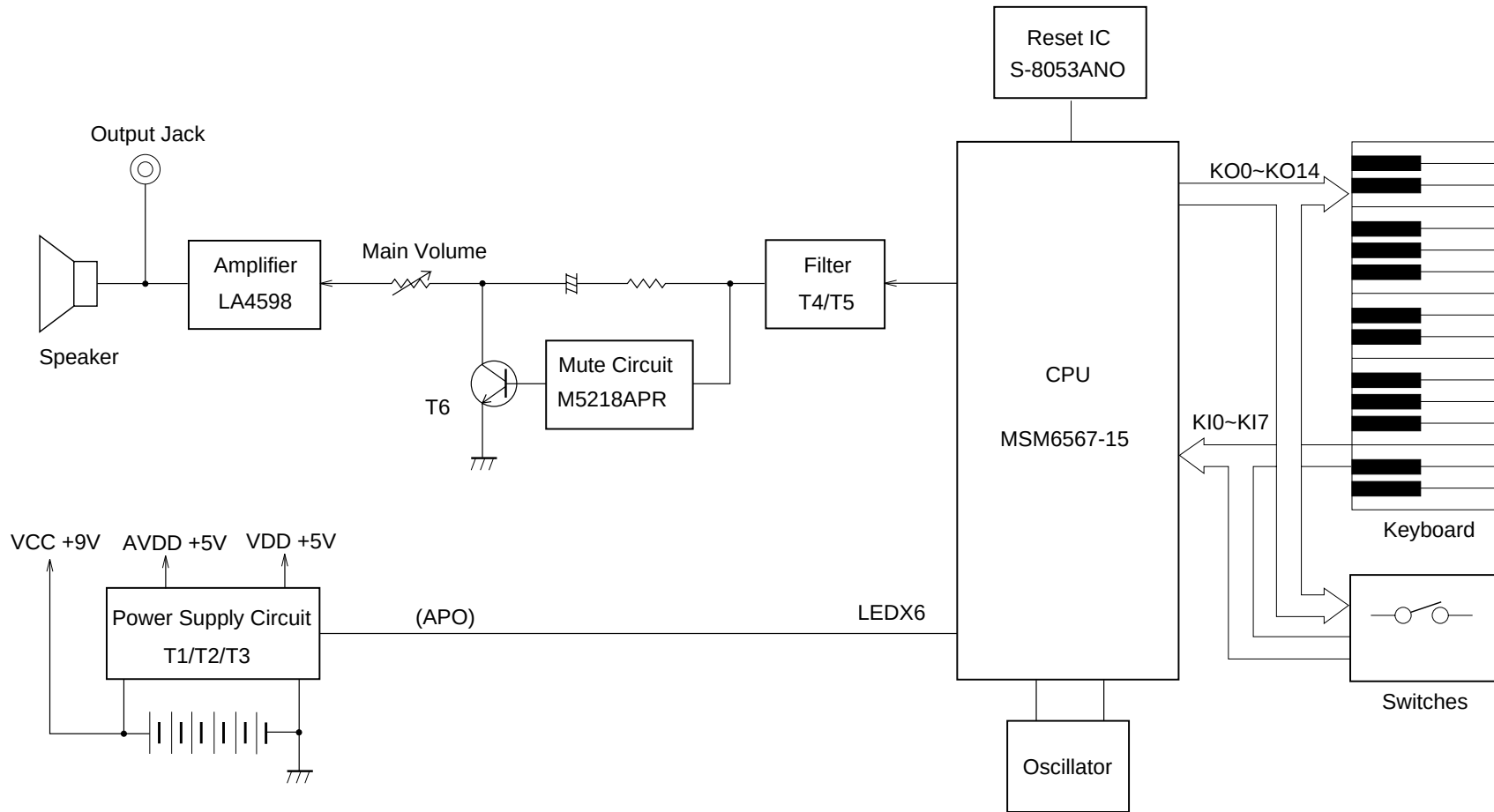
1. Before assembling the PCBs, check that all clicks are free, and properly aligned.
2. Set the PCBs in the bumps opposite to the clicks.
3. Press down the PCBs until clicking.

When clicks are deformed, screw the PCBs on the case.
The screw is available from our spare parts center.

Code No. 0009 2682 Screw 2.6 x 8



BLOCK DIAGRAM

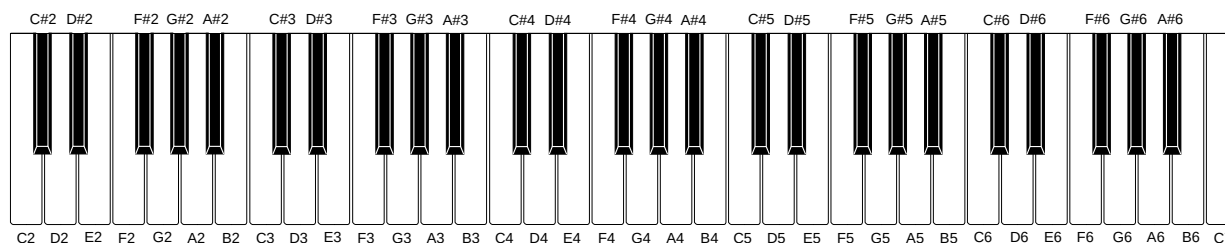


CIRCUIT DESCRIPTION

Key and Switch Matrix

	KI0	KI1	KI2	KI3	KI4	KI5	KI6	KI7
KO0		Power OFF	C2	C#2	D2	D#2	E2	F2
KO1		Play	F#2	G2	G#2	A2	A#2	B2
KO2		Fingered	C3	C#3	D3	D#3	E3	F3
KO3		CASIO Chord	F#3	G3	G#3	A3	A#3	B3
KO4		Song	C4	C#4	D4	D#4	E4	F4
KO5			F#4	G4	G#4	A4	A#4	B4
KO6			C5	C#5	D5	D#5	E5	F5
KO7			F#5	G5	G#5	A5	A#5	B5
KO8			C6	C#6	D6	D#6	E6	F6
KO9			F#6	G6	G#6	A6	A#6	B6
KO10			C7	4	3	2	1	0
KO11	Tempo Down	Accomp. Volume 1 (Min.)				7	6	5
KO12	Tempo Up	Accomp. Volume 2						
KO13		Accomp. Volume 3		Tone	Rhythm	Melody ON/OFF	Start/ Stop	Sync/ Fill-in
KO14		Accomp. Volume 4 (Max)						

Nomenclature of Keys



CPU (MSM6567-15)

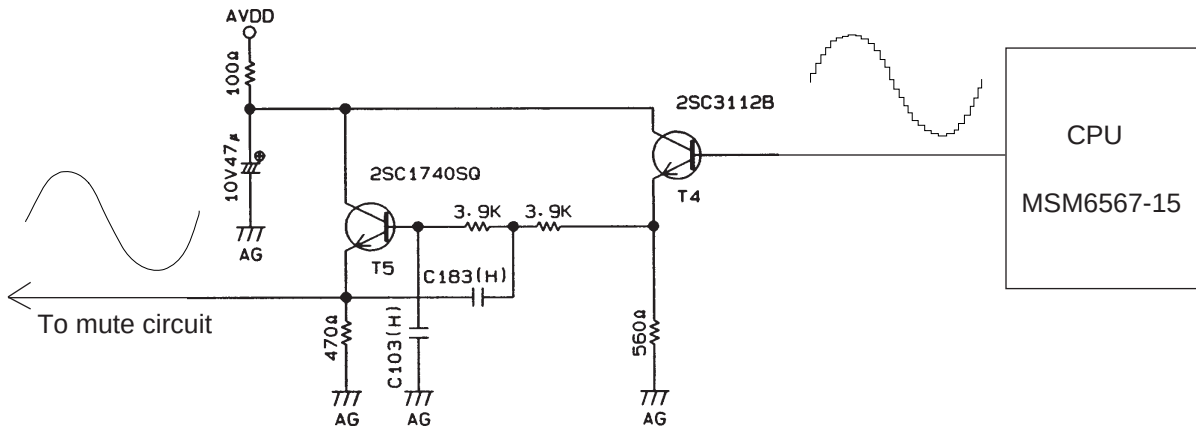
Containing sound data ROM and DAC (Digital to Analog Converter), the CPU provides sound waveform in accordance with the pressed key and the selected tone.

The following table shows pin function of the LSI.

Pin No.	Terminal	In/Out	Function
1	LEDY0	Out	Not used.
2	LVDD1	In	+5V source
3	LGND2	In	Ground (0V) source
4 ~ 9	LEDX0 ~ LEDX5	Out	Not used.
10	LEDX6	Out	APO(Auto Power Off) signal output ON: "H" OFF: "L"
11	LEDX7	Out	Not used.
12	LVDD2	In	+5V source
13 ~ 27	—	—	Not used.
28	GND2	In	Ground (0V) source
29	COSI	In	43.45MHz clock pulse input
30	COSO	Out	43.45MHz clock pulse output
31	VDD	In	+5V source
32	GND2	In	Ground (0V) source
33 ~ 35	TEST1 ~ TEST3	—	Not used. Connected to ground.
36	MI	In	Not used. Connected to +5V.
37	-RESET	In	Reset signal input
38	AVDD	In	Ground (0V) source for internal DAC
39	OUT	Out	Sound waveform output
40	AGND	In	Ground (0V) source for internal DAC
41 ~ 48	KI0 ~ KI7	In	Input terminals for keys and switches
49 ~ 63	KO0 ~ KO14	Out	Key and switch scan signal output
64 ~ 72	—	—	Not used.
73	LGND1	In	Ground (0V) source
74 ~ 80	—	—	Not used.

Filter Block

Since the sound signal from the CPU is a stepped waveform, the filter block is added to smooth the waveform.

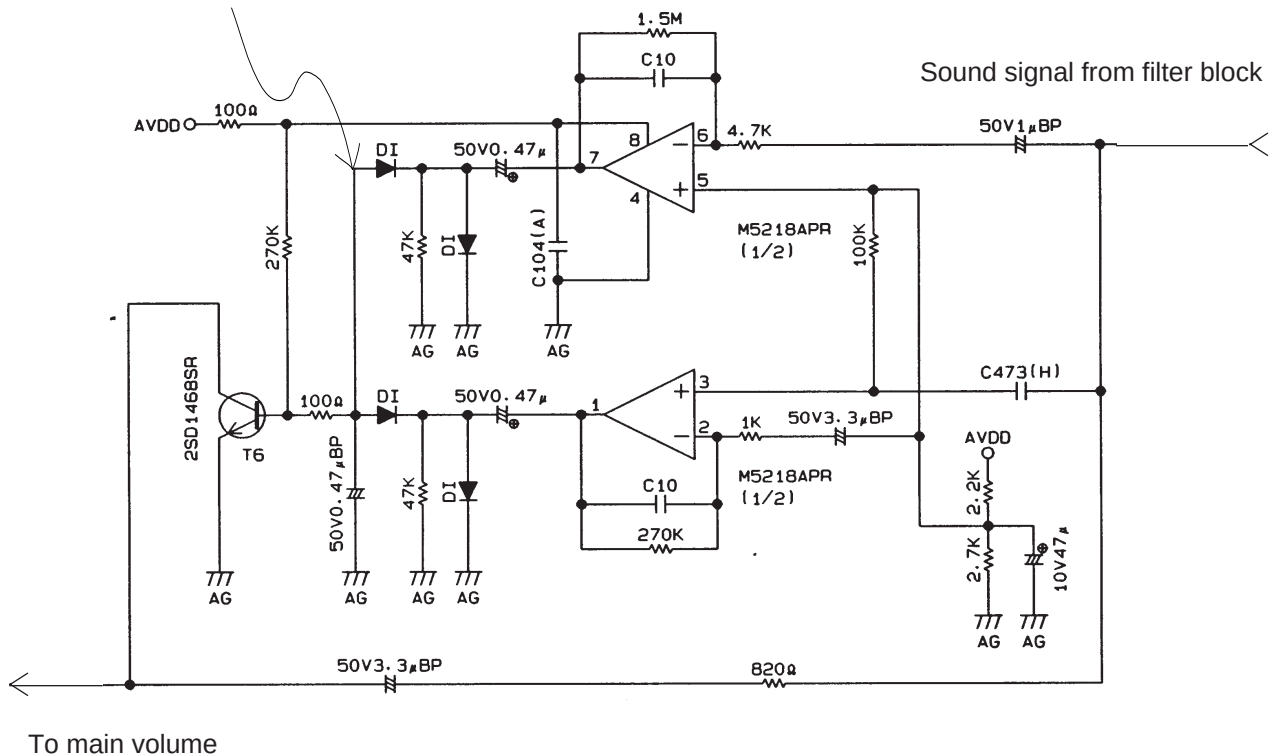


Mute Circuit

The mute circuit removes noise from the sound signal just before the signal fades away. The circuit detects amplitude of the decaying sound signal by amplifying it by 1000 times, and transistor T6 flows the signal into the ground when the amplitude decays almost zero.

+0.5V at the minimum amplitude (no sound)

-2.7V at the maximum amplitude

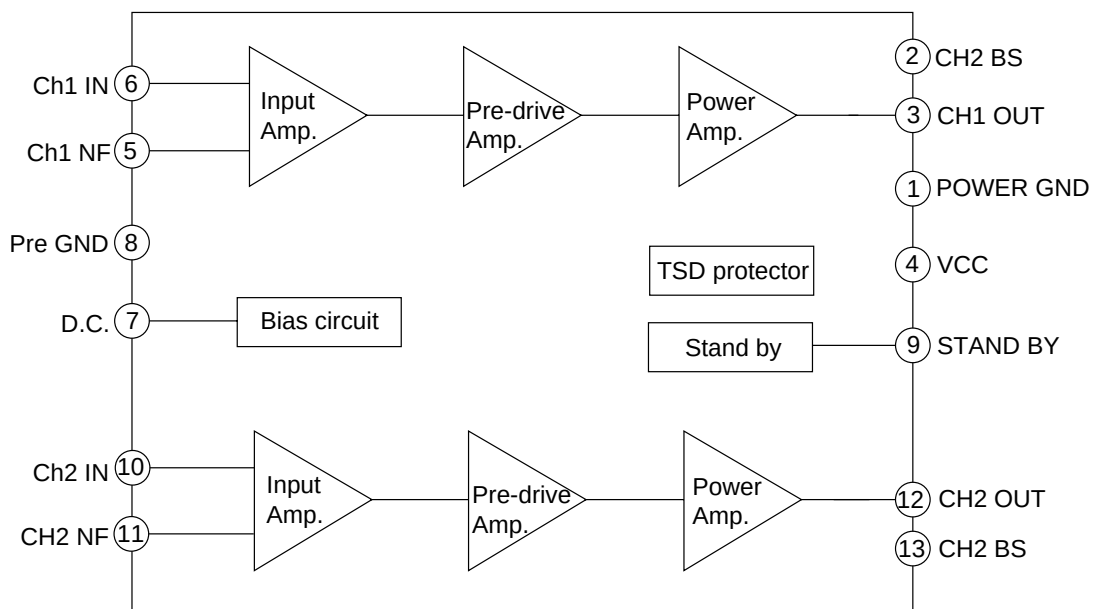


Power Amplifier (LA4598)

LA4598 is a 2-channel power amplifier with stand-by switch.
The following table shows the pin function of the power amplifier.

Pin No.	Terminal	In/Out	Function
1	Power GND	In	Ground (0V) source
2	Ch1 B.S.	—	Terminal for bootstrap capacitor
3	Ch1 OUT	Out	Channel 1 output
4	VCC	In	+9V source
5	Ch1 N.F.	In	Negative feedback input
6	Ch1 IN	In	Channel 1 input
7	D.C.	—	Terminal for decoupling capacitor
8	Pre GND	In	Ground (0V) source
9	Stand by	In	Power control signal input. 0V: OFF, +9V: ON
10	Ch2 IN	In	Channel 2 input
11	Ch2 N.F.	In	Negative feedback input
12	Ch2 OUT	Out	Channel 2 output
13	Ch2 B.S.	—	Terminal for bootstrap capacitor
14	NC	—	Not used.

Block Diagram



Power Supply Circuit

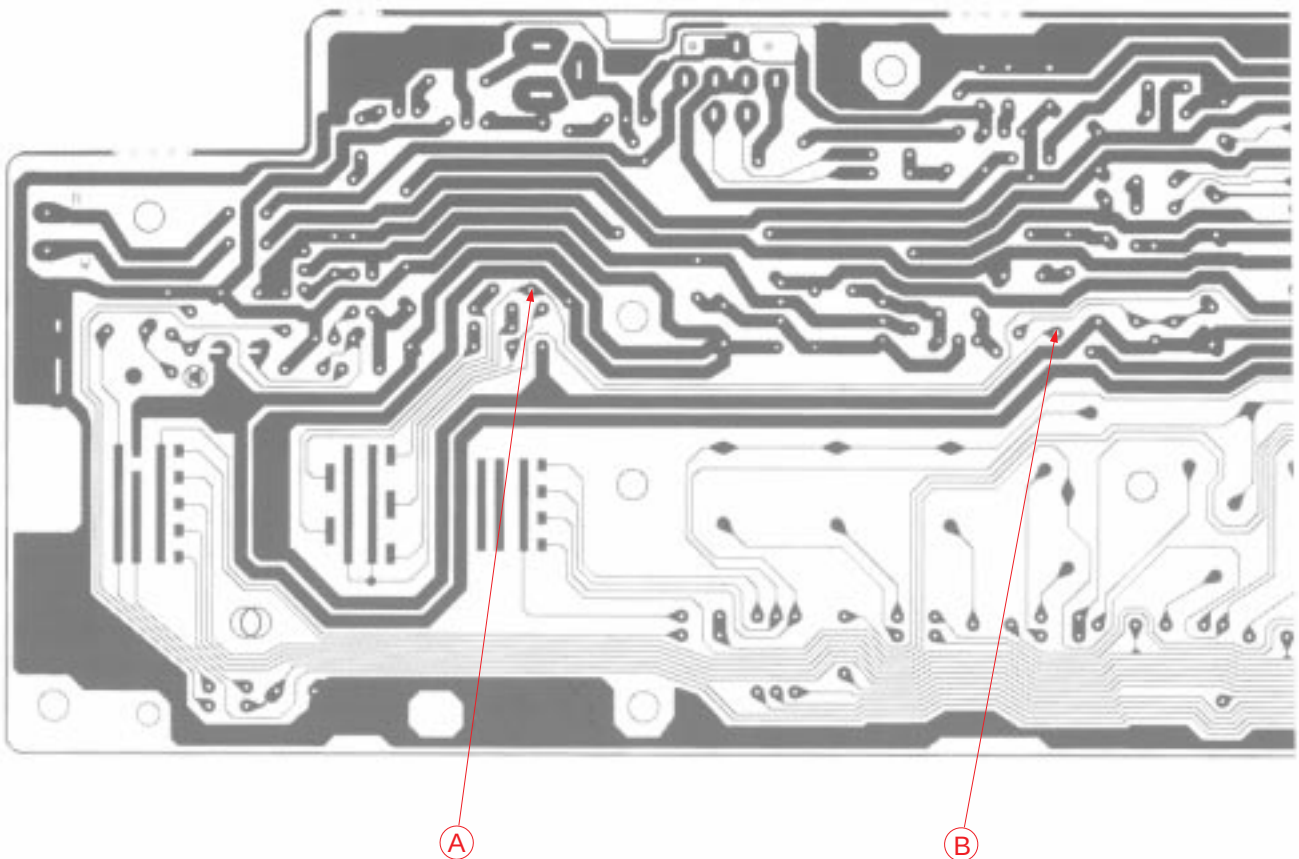
The power supply circuit generates three voltages - VDD (+6.0V) for the CPU and the reset IC, AVDD (+6.0V) for the analog circuit, and VCC1 (+8.6V) for the pilot lamp and the power amplifier.

When turning power on, the 100 μ capacitor makes transistor T2 on first then the CPU provides transistor T2 "High" of APO signal to keep it being on.

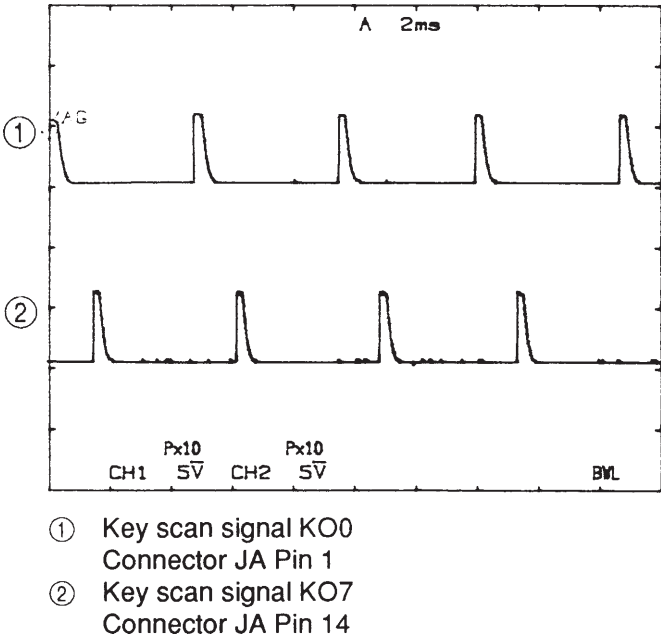
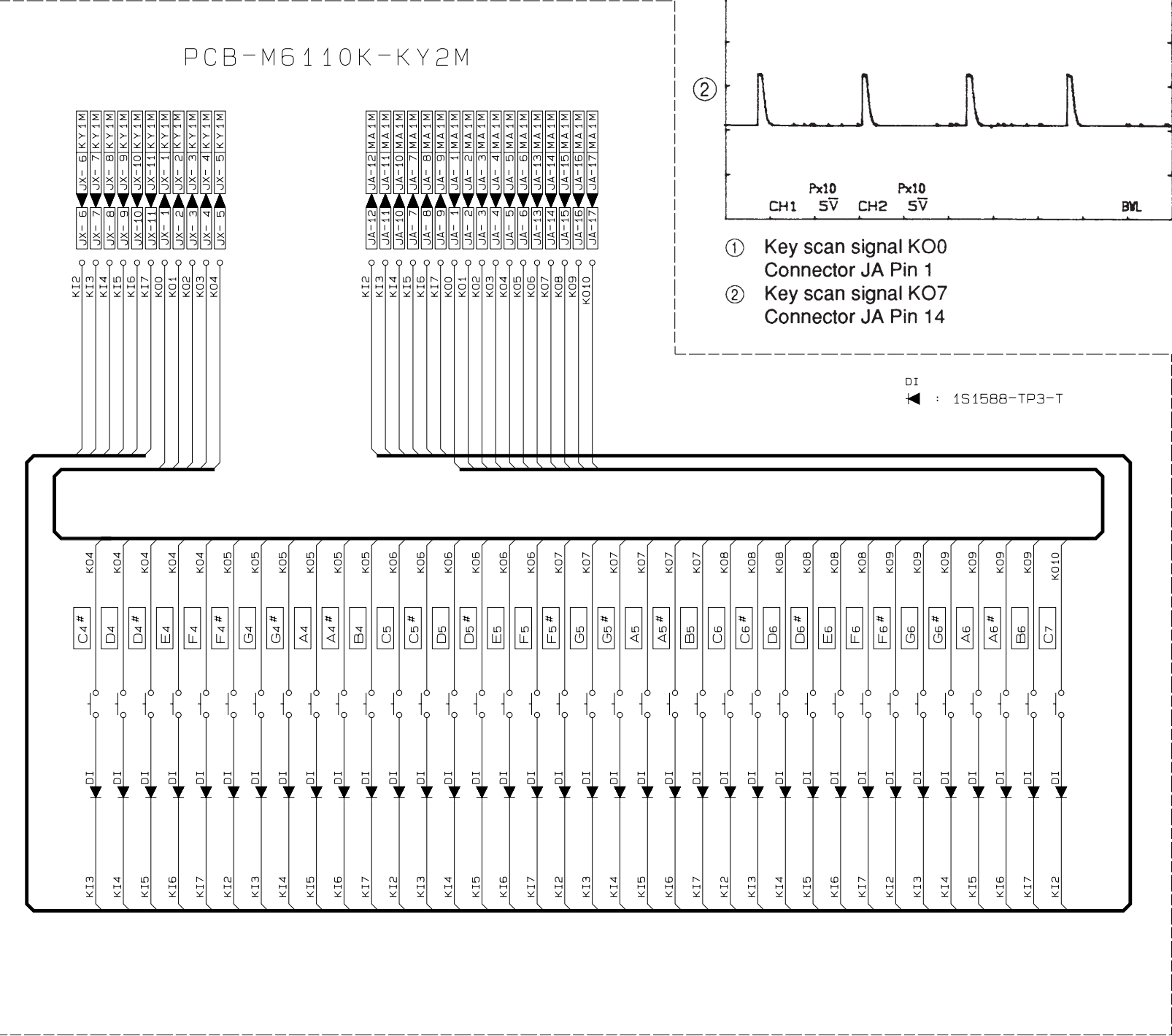
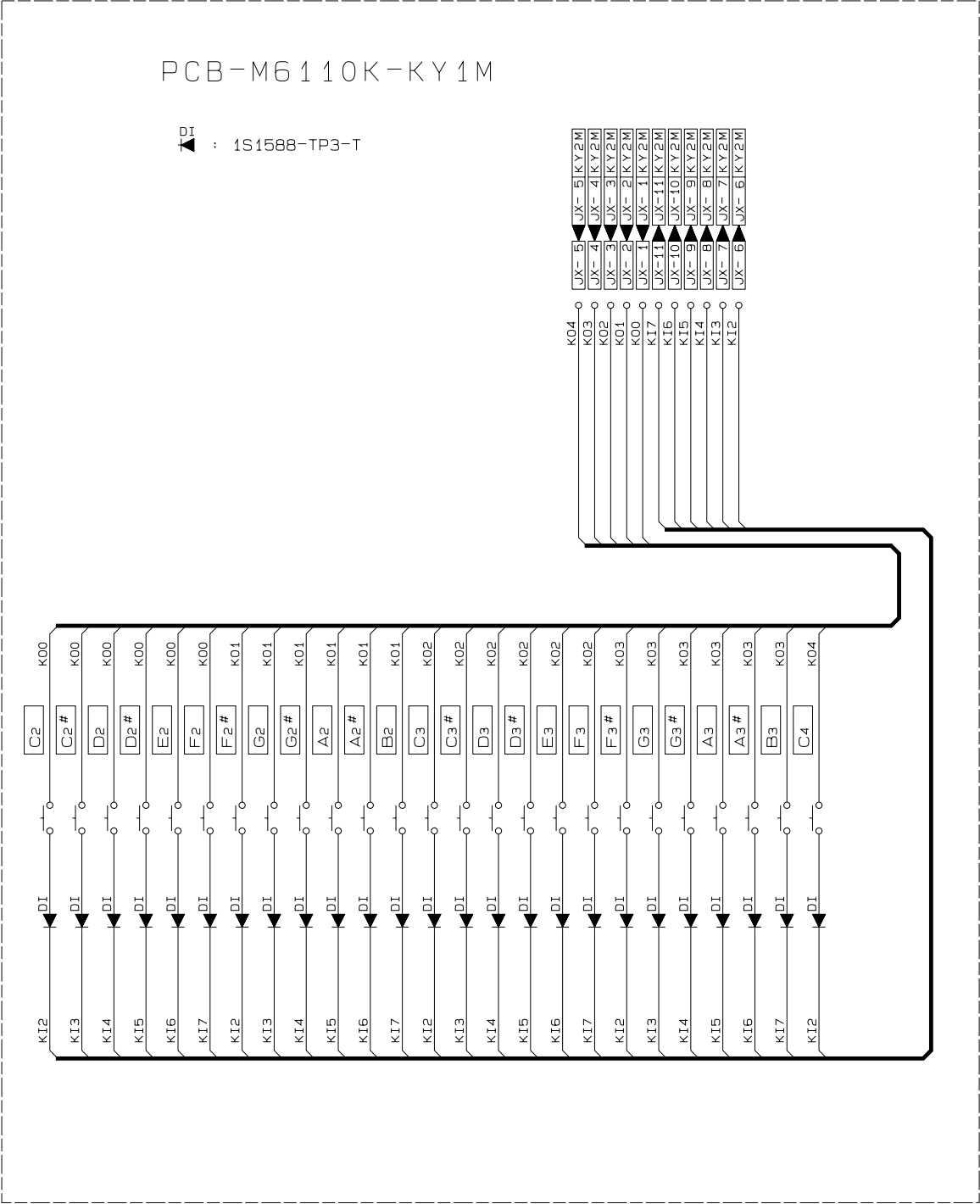
HOW TO GET POWER IN OPENING TOP PANEL

1. Remove the mode switch contact from the top panel.
2. Make short-circuit (A) and (B) with a wire as shown below.
3. Connect an AC adaptor to the DC jack.
4. Place the contact on carbon paint of the mode switch.
5. Align the contact onto OFF position.
6. Slide the contact to PLAY position so that the pilot lamp lights up.
7. Take the contact off the carbon paint.

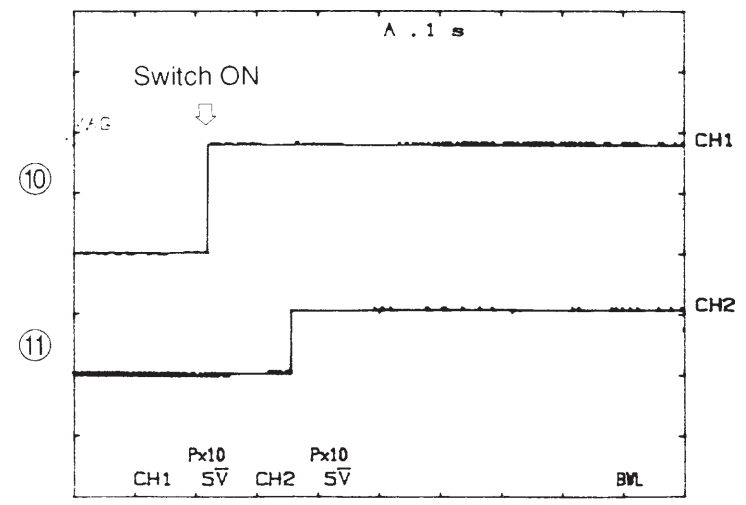
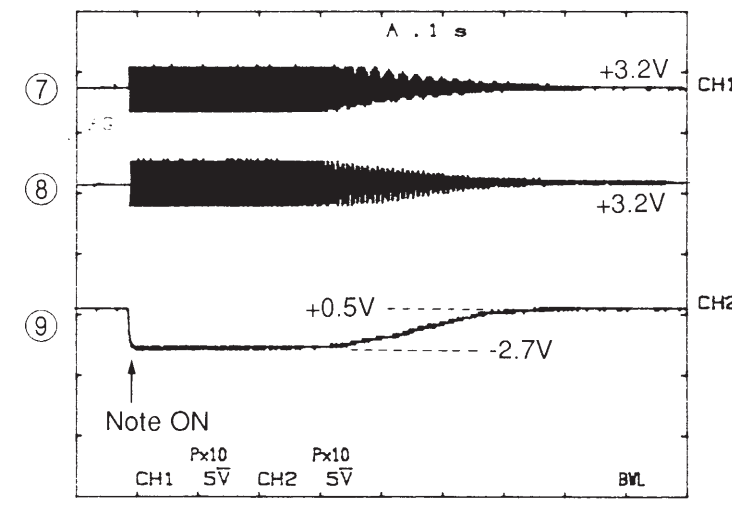
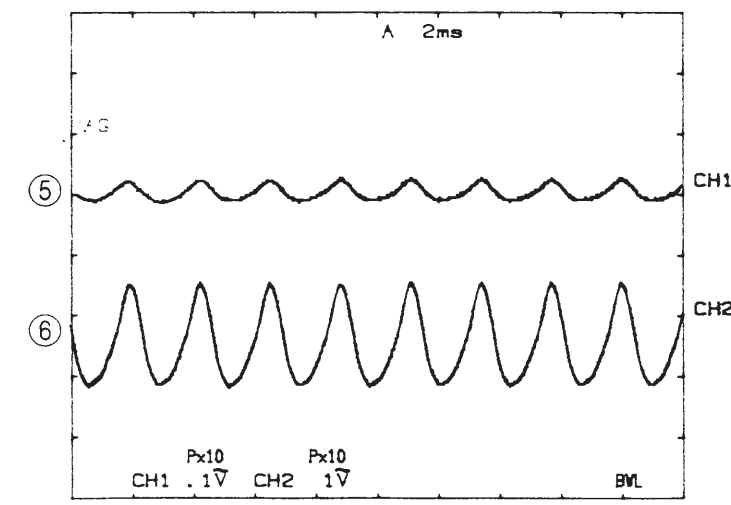
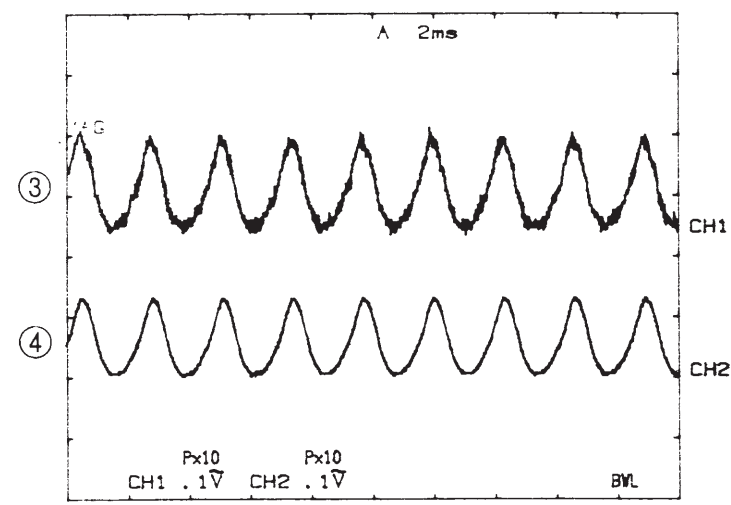
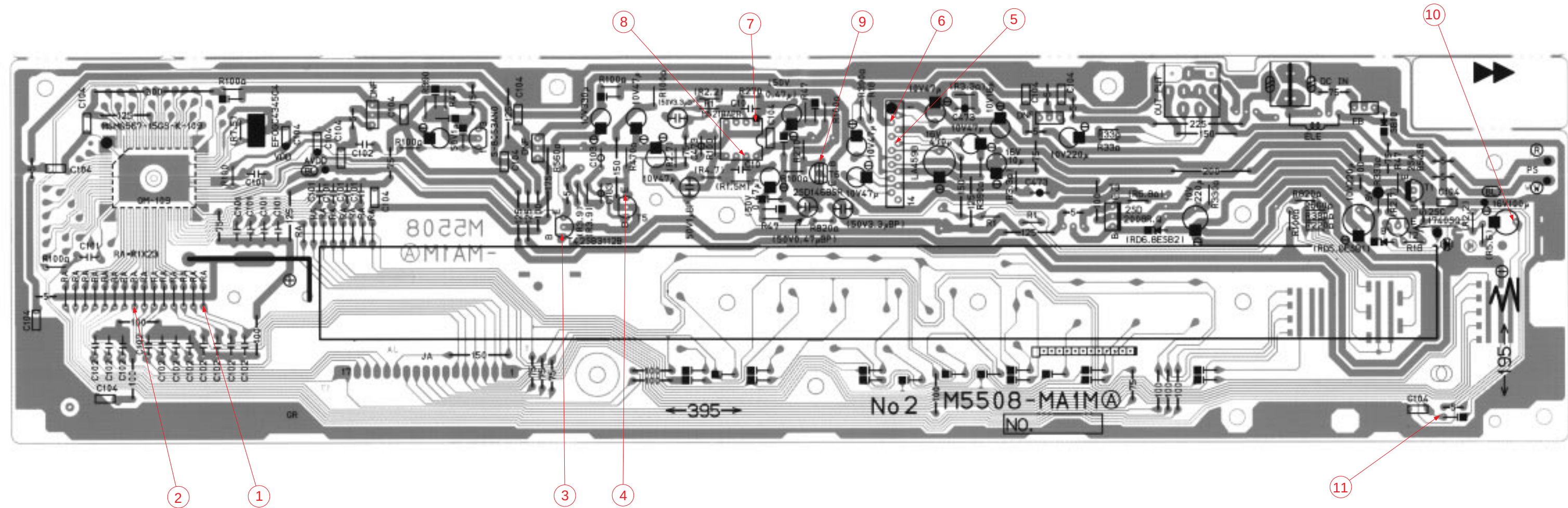
The unit will operate until disconnecting the AC adaptor or automatic power off, and it sounds at full volume.



SCHEMATIC DIAGRAMS



PCB VIEW AND MAJOR WAVEFORMS



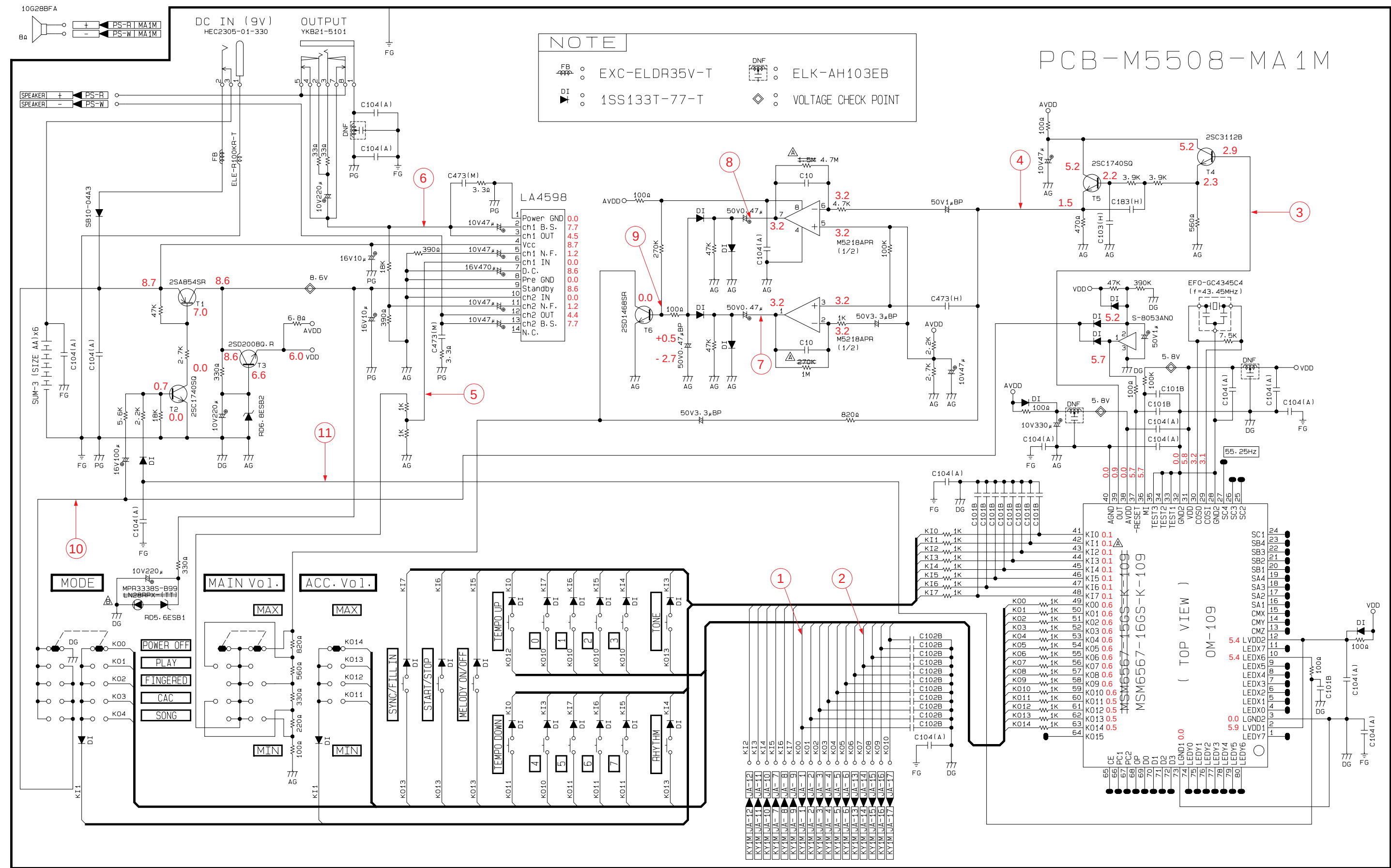
- ③ Sound signal output
MSM6567-15 Pin 39
Tone : Flute
- ④ Filter output
2SC1740SQ Emitter
Key : A4
Volume : Max

- ⑤ Power amp. input
LA4598 Pin 6
- ⑥ Power amp. output
LA4598 Pin 3

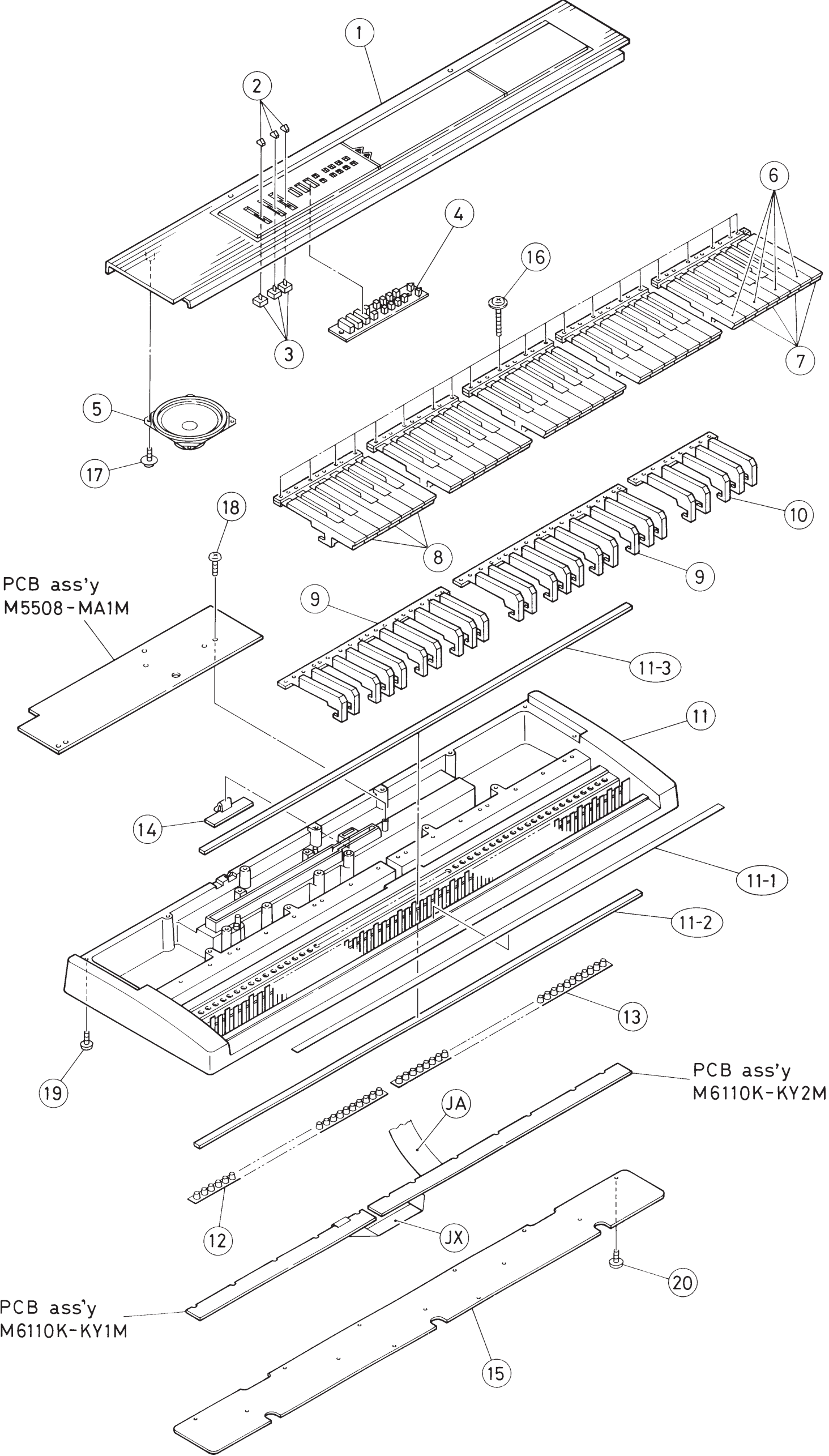
- ⑦ OP amp. output
M5218APR Pin 1
- ⑧ OP amp. output
M5218APR Pin 7
- ⑨ Mute signal
2SD1468SR Base

- ⑩ Power ON signal
Mode switch
- ⑪ APO signal
MSM6567-15 Pin 10

M5508-MA1M

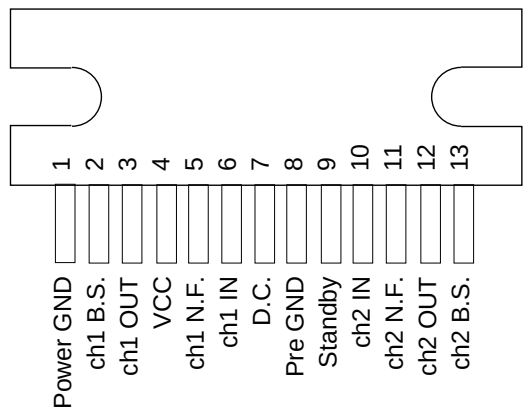


EXPLODED VIEW

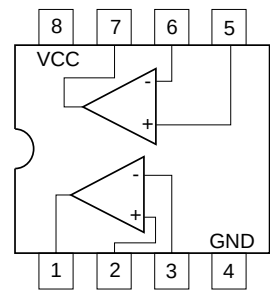


IC AND TRANSISTOR LEAD IDENTIFICATIONS

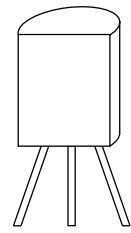
LA4598



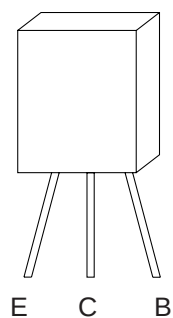
M5218APR



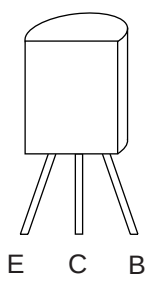
S-8053ANO



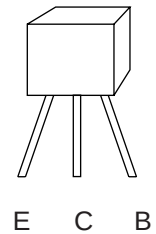
2SD2008Q,R



2SC3112B



2SA854SR
2SC1740SQ
2SD1468SR



PARTS LIST

CTK-450

- Notes:
1. Prices and specifications are subject to change without prior notice.
 2. As for spare parts order and supply, refer to the "GUIDEBOOK for Spare parts Supply", published separately.
 3. The numbers in item column correspond to the same numbers in drawing.

N	Item	Code No.	Parts Name	Specification	Q	M	FOB Japan N.R.Yen Unit Price	R	*
PCB Ass'y M5508-MA1M									
N		2011 6979	LSI	MSM6567-15GS-K-109	1	1	1,060	A	L
		2105 2219	IC	S-8053ANO	1	5	60	A	B
		2114 1799	IC	M5218APR	1	5	38	A	A
		2114 2891	IC	LA4598	1	1	140	A	B
		2220 1387	Transistor	2SC1740SQ-TP-T	2	10	13	A	A
		2250 0168	Transistor	2SA854-SR-TP-T	1	10	20	A	A
		2252 0168	Transistor	2SC3112B-TPE2-T	1	10	15	A	A
		2253 0357	Transistor	2SD2008Q,R-T105-T	1	10	30	A	A
		2253 0420	Transistor	2SD1468SR,S-TP-T	1	10	16	A	A
		2310 7767	Zener diode	RD6.8ESB2-T1-T	1	10	16	B	A
		2360 1631	Zener diode	RD5.6ESB1-T1-T	1	10	8	B	A
		2370 0343	LED	LN28RPX-(TT)	1	10	16	C	A
		2390 1316	Diode	SB10-04A3-BT-T	1	10	28	C	A
		2390 1344	Diode	1SS133T-77-T	27	20	3	C	A
		2590 1176	Ceramic oscillator	EFO-GC4345C4	1	1	110	B	B
		2606 0560	Carbon film resistor	R-20-1.5M-J-T24-T	1	20	3	C	A
		2606 1141	Carbon film resistor	R-20-1K-J-T23-T	26	20	2	C	A
		2606 1155	Carbon film resistor	R-20-330-J-T23-T	3	20	2	C	A
		2606 1169	Carbon film resistor	R-20-100-J-T23-T	8	20	2	C	A
		2606 1176	Carbon film resistor	R-20-100K-J-T23-T	2	20	2	C	A
		2606 1204	Carbon film resistor	R-20-3.3-J-T23-T	2	20	2	C	A
		2606 1253	Carbon film resistor	R-20-4.7K-J-T23-T	1	20	2	C	A
		2606 1288	Carbon film resistor	R-20-2.2K-J-T23-T	2	20	2	C	A
		2606 1295	Carbon film resistor	R-20-2.7K-J-T23-T	2	20	2	C	A
		2606 1309	Carbon film resistor	R-20-470-J-T23-T	1	20	2	C	A
		2606 1316	Carbon film resistor	R-20-47K-J-T23-T	4	20	2	C	A
		2606 1365	Carbon film resistor	R-20-3.9K-J-T23-T	2	20	2	C	A
		2606 1428	Carbon film resistor	R-20-5.6K-J-T23-T	1	20	2	C	A
		2606 1435	Carbon film resistor	R-20-560-J-T23-T	2	20	2	C	A
		2606 1442	Carbon film resistor	R-20-18K-J-T23-T	2	20	2	C	A
		2606 1456	Carbon film resistor	R-20-390K-J-T23-T	1	20	2	C	A
		2606 1470	Carbon film resistor	R-20-7.5K-J-T23-T	1	20	2	C	A
		2606 1477	Carbon film resistor	R-20-33-J-T23-T	2	20	2	C	A
		2606 1484	Carbon film resistor	R-20-820-J-T23-T	2	20	2	C	A
		2606 1533	Carbon film resistor	R-20-270K-J-T23-T	3	20	2	C	A
		2606 1652	Carbon film resistor	R-20-390-J-T23-T	2	20	2	C	A
		2606 1757	Carbon film resistor	R-20-6.8-J-T23-T	1	20	2	C	A
		2801 7413	Electrolytic capacitor	10RE2-330-T2-T	1	10	26	C	A
		2801 7910	Electrolytic capacitor	16RE3-470-T2-T	1	10	27	C	A
		2802 9833	Electrolytic capacitor	50RBP2-3R3-T2-T	2	10	18	C	A
		2802 9840	Electrolytic capacitor	50RBP2-R47-T2-T	1	10	18	C	A
		2802 9938	Electrolytic capacitor	50RBP2-1-T2-T	1	10	18	C	A
		2805 3142	Electrolytic capacitor	16RE2-10-T2-T	2	10	14	C	A
		2807 1023	Electrolytic capacitor	50RE2-1-T2-T	1	10	15	C	A
		2807 1082	Electrolytic capacitor	16RE2-100-T2-T	1	10	27	C	A
		2807 1121	Electrolytic capacitor	10RE2-220-T2-T	3	10	26	C	A
		2807 1139	Electrolytic capacitor	50RE2-R47-T2-T	2	10	12	C	A
		2807 1180	Electrolytic capacitor	10RE2-47-T2-T	6	10	16	C	A
		2813 1939	Semiconductive capacitor	RT-B70TKYR473K-T	1	20	9	C	A
		2813 2093	Semiconductive capacitor	RT-B50TKYR103K-T	1	20	4	C	A
		2813 2422	Semiconductive capacitor	RT-B50TKYR183K-T	1	20	5	C	A
		2813 3283	Ceramic capacitor	UP050F104Z-A-B	16	20	8	C	A
		2818 0365	Ceramic capacitor	RT-HE50TKYB102K-T	12	20	3	C	A
		2818 0446	Ceramic capacitor	RT-HE40TKYB101K-T	10	20	4	C	A

Notes: N – New parts
M – Minimum order/supply quantity
R – Rank

N	Item	Code No.	Parts Name	Specification	Q	M	FOB Japan N.R.Yen Unit Price	R	*
		2819 0395	Ceramic capacitor	RT-HE40TKSL100F-T	2	20	6	C	A
		2830 6436	Mylar capacitor	AMZV-473K50-T	2	20	9	C	A
		2845 3220	Ferrite beads	EXC-ELDR35V-T	1	10	12	C	A
		3025 0658	EMI filter	ELK-AH103EB	3	10	26	C	A
		3501 7049	DC jack	HEC2305-01-330	1	5	29	A	A
		3612 0711	Miniature jack	YKB21-5101	1	1	90	B	B
N		3841 0959	Inductor	ELE-R100KR-T	1	10	25	C	A
N		4317 4280	Blank PCB M5508-MA1M	M111780-1	1	1	230	C	C
		6921 6211	Battery spring 700B	M412171A-1	1	20	12	C	A
N		6922 4850	PCB ass'y M5508-MA1M	M111781*1	1	1	3,300	B	V
N		6922 4940	Battery spring 508	M412289-1	1	20	18	C	A
N		6922 5360	Felt 22x280	M412314-1	1	20	25	C	A
PCB Ass'y KEY									
	JX	2301 0101	Diode	1S2473-T-77-T	61	20	8	C	A
		3719 4256	Ribbon cable MASKL61	DF5H11180-MM	1	10	41	C	A
N	JA	3719 4263	Ribbon cable M508A	DF5H17180-MM	1	5	60	C	B
N		4317 4290	Blank PCB M6110K-KY1M	M211755-1	1	5	88	C	B
N		4317 4301	Blank PCB M6110K-KY2M	M111784A-1	1	5	80	C	B
N		6922 4860	PCB ass'y KEY	M111785*1	1	1	1,300	C	N
Mechanical Parts									
N	1	6922 4990	Panel 508	M111754-1	1	1	1,060	C	L
	2	6921 5031	Slide knob 601	M311859A-1	3	10	13	B	A
	3	6909 5890	SL contact 12D	CSB-12D	3	10	35	B	A
N	4	6922 4500	Rubber button 508	M211736-1	1	5	140	B	B
	5	3831 0637	Speaker	10G28BFA	1	1	190	B	C
		6910 1130	Sponge A	M4630-1	1	10	14	C	A
	6	6917 4474	White key CEGB	M110589D-1	5	1	120	A	B
	7	6917 4484	White key DFAS	M110590D-1	1	1	110	A	B
	8	6917 4494	White key DFA	M110591D-1	4	1	170	A	B
	9	6917 4506	Black key 10P	M110594F-1	2	1	130	A	B
	10	6918 5996	Black key 5P	M110594F-3	1	5	81	A	B
	11	6922 4980	Upper case sub ass'y	M111755-1	1	1	1,400	C	O
N	11-1	6922 4960	Upper key stopper 61	M412310-1	1	5	88	C	B
N	11-3	6922 4971	Lower key stopper 61	M412311A-1	1	5	77	C	B
N	11-2	6922 5740	Key damper 61	M412332-1	1	5	35	C	A
N	12	6922 3990	Key contact rubber PET-TAC30A	M111764-1	1	1	190	B	C
N	13	6922 4000	Key contact rubber PET-TAC31A	M111765-1	1	1	190	B	C
N	14	6906 7093	Battery cover sub ass'y	M311200C*12	1	1	38	B	A
N	15	6922 4951	Bottom plate 508	M211737A-1	1	1	340	C	D
N		6908 6160	Felt 156G	M43073-1	4	20	7	C	A
Screws									
	16	0009 4588	Screw	2.6 x 18	21	50	2	C	A
	17	0009 4589	Screw	2.6 x 8	4	50	2	C	A
	18	0009 2682	Screw	2.6 x 8	3	50	2	C	A
	19	0008 6417	Screw	4 x 10	20	50	2	C	A
	20	0009 2680	Screw	4 x 8	8	50	2	C	A
Accessory									
		6916 7880	Music stand U	M310827-1	1	1	120	C	B

Notes: N – New parts
M – Minimum order/supply quantity
R – Rank